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THE INFLUENCE OF DIFFERENT FACTORS ON BULLS CARCASS CONFORMATION CLASS IN LITHUANIA

A. STIMBIRYS*[1], L. SHERNIENĖ[1], V. PRUSEVICHUS[3], V. JUKNA[2], Al. SHIMKUS[2] and Al. SHIMKIENĖ[2]
[1] *Veterinary Academy Lithuanian University of Health Sciences, Department of Food Safety and Quality, LT-4781 Kaunas, Lituania*
[2] *Veterinary Academy Lithuanian University of Health Sciences, Department of Animal Husbandry, LT-4781 Kaunas, Lithuania*
[3] *Lithuanian Ministry of Agriculture, LT-0110, Vilnius, Lithuania*

Abstract

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The aim of this study was to identify the influence of cattle breed, age, live weight, carcass weight, and yield on beef carcass conformation class. The electronic databases from "Meat master" program, operated in Lithuanian slaughterhouses, were used in this study. The data, without being tied to one of them, taken from 75 bulls' classified carcasses, were divided into 5 (EUROP) conformation classes.

Before slaughtering bulls according to their age were divided into 2 age categories A (up to 24 months) and B (over 24 months).

Study results shown that bulls carcasses, included into supreme (E & U) conformation classes were obtained from specialized beef breeds (mostly Aubrac, or their crossbreds). It was detected that carcasses assessed by the lowest (O and P) conformation classes, bulls' mothers and fathers most frequently (79.7%) were obtained from a Lithuanian black and white and Lithuanian red breed cattle and their crossbreds; only 20.3% of the slaughtered bull parents were specialized beef (Charolais, Limousin, Simmental beef) breeds. Bulls, whose carcasses were evaluated with the excellent (E) conformation class, were 9.4 months ($P \leq 0.001$) older than those with the lowest rate – poor (P) class. B category live cattle before slaughter were in 142 kg heavier ($P \leq 0.004$), their carcass weight was in 130 kg more ($P \leq 0.0001$), and carcass yield in 6.69% ($P \leq 0.001$) greater than A. This study showed that beef carcass conformation class related to carcass weight. Increasing in carcass conformation class (from P to E) lifted carcass weight (from 250.7 kg. up to 399.1 kg.), as well as carcass yield percentage (on average about 3% for each of the class).

Key words: bulls, breed, crossbreds, live weight, conformation class, carcass weight and yield

Introduction

According to classification system beef carcasses are divided into 6 (S- EUROP) conformation classes in Europe union countries (1208/81/EEC; 1026/91/EEC). The conformation score ranges from S (Superior) — a less commonly used category, but used by some countries to describe double-muscled carcasses, via E (Excellent) through to P (Poor). Belgium is one of the EU countries, there a lot of double – muscled Belgian Blue beef breed cattle, which has extremely high muscularity are slaughtered in slaughterhouses there each year (Coopman et al., 2004).

In EU countries beef carcasses evaluation with R (good) conformation class are most common.

Opposite in Lithuania muscularity of beef carcasses is not high, since there are a lot of dairy cattle breeds being held

**Corresponding author:* arturas@lva.lt

in this country, and its‘ carcasses are often valued by O and P muscularity classes.

Various researches has been reported that cattle breeds and individual animals differ among each other not only by their live weight, carcass mass, makeweight per day, and by the quality of their meat as well (Rødbotten et al., 2002; Krupa et al., 2005).

It is also has been established that the conformation of carcass highly depends on the cattle breed, its' age, and sex (Serra et al., 2004; Jukna et al., 2009) and other factors.

In the meantime Lithuania was integrating into European Union, and from 2001 it was decided to use a new beef carcass classification method in slaughterhouses in order to detect their quality there.

Presently the beef cattle became popular, and their number has increased in Lithuania; nevertheless there is still growing a lot of dairy type native Lithuanian black & white and Lithuanian red breeds animals and their crossbreds. According to the data of Rural Business Development and Information Centre, during the last 4 (2009-2013) years the number of purebred beef cattle population has increased in 1.73 times, (crossbreds – 1.12 times), however purebred beef cattle are being held less by 5.41 times than their crossbreed (www. vic. lt/ (approach via internet on 2013 13th, January).

According to worldwide traditions in order to increase bovine meat muscularity dairy cows are often being inseminated with the bull sperm, obtained from beef cattle specialized breeds. From scientific viewpoint, trying to derive high quality's‘beef carcass, it is very important to select breeds convenient for crossing (Keane, Molone, 2009; Jukna et al., 2010).

Looking from the practical side, it is very important for animal breeders to know, which main factors influenced on conformation class score in beef carcasses.

The aim of this study was to identify the influence of breed, age, pre-slaughtering and post- slaughtering weight, carcass yield on the conformation class of bulls.

Materials and Methods

The live weight, and carcass meat data of 14 cattle breeds and their crossbreds, slaughtered during 2009-2011 years period, analyzed and their data were summarized in this article.

Bulls were slaughtered in slaughterhouses, Joint stock companies (JSC)„Utenos mėsa“, „Agrovet, „Vilkė“, „Agaras“. The data, obtained from slaughtered adult bulls, and their carcasses evaluation values, using S-EUROP system, were analyzed making profit on data base of „Meat Master“ programme. There were 75 bulls (belonging to A-B categories) carcasses analyzed in this study; 15 to each, belonging to each from 5 conformation classes (EUROP), were selected from „Meat Master“ and programmed by random selection without attaching to some index. The influence of bulls breed, age, live weight, carcass weight and carcass yield on their carcass conformation class were analyzed. Bulls were divided into two categories A (up to 24 months) and B (over 24 months). The data about slaughtered cattle genetic (their parents) it was obtained from Rural Business Development and Information Centre.

The obtained research data in this study was analyzed using SPSS (version 9) statistical package. There were calculated minimal (min) and maximal (max) values of indexes, arithmetical averages (M), average square deviations (Sd), variation rates (Cv) and errors of arithmetical average (Mx). The influence of factors (breed, age, conformation class) to intermittent values (live and carcass weight, and carcass yield) was evaluated using ANOVA method. Statistical reliability of differences between the indexes was calculated by using Bonfferoni method; the differences were statistically significant, than $P \leq 0.05$.

Results and Discussion

During this study, the research data, obtained from slaughtered different cattle breeds, which are held in Lithuania and their crossbreds, were analyzed.

According to various authors research data, breed (Krupa et al., 2005; Alberti et al., 2009 Jukna et al., 2010) and other genetic factors (Campion et al., 2009) has a big influence on the development of conformation class and other pre-slaughtering indexes (live mass weight, live weight gain, carcass weight and yield) in bovine animals.

The quantity of beef cattle and their crossbreds increase each year in Lithuania and constitutes a bigger part of representatives of this kind, and in 2012 this amount has out measured 13% of all neat held in the country (Rural Business Development and Information Centre, 2013).

In order to identify what factors influenced on bulls carcass conformation class, data taken from 75 adult bulls carcass was analyzed (Table 1).

The analysis of slaughter data showed that distribution of bulls' breeds, that had been estimated to have excellent (E) muscularity class, is not very wide. Eight (53.3%) from fifteen tested bulls were purebred Aubracs. Our data confirms the other researches (Pedrafita et al., 2010), that this breed is suitable for breeding in extensively conditions, and distinguishes from other bovine animal breeds with great yield of muscle.

Other bulls of this muscularity class exceptionally had fathers of only specialized beef (6 – Limousin, 1 – Charo-

Table 1
Adult bulls breeds' and ages' influence to muscularity of carcass

n	Carcass Conformation class (SEUROP)	Age, months	Representatives of breeds
15	E	29.3	AB* - 8, LBWxLI – 5; LBWxLIxLI – 1; LBWxCHxCH - 1
15	U	22.3	LBWxLI – 1; LBWxSL – 2; LBWxBB – 1; LBWxLIxLI – 2; LBWxSIxLI – 1; LBWxCHxCH – 1; CH – 2; AB – 1; LI-1; LRxCH -2; LRxLI – 1;
15	R	18.4	HE – 1; LBWxHE – 1; LBWxLI – 1; LI – 1; LBWxLIxLI – 1; LJxCHxCH – 1; LBWxCH – 3; CH – 1; LBWxBB – 1; LBWxSL – 2; LRxSR -1; LRxCHxCH - 1
15	O	20.1	LBWxSI – 2; LBWxGBW – 3; LBW – 1; LBWxH – 2; LBWxCH – 2; LBWxLI – 1; LR– 1 LRxSR – 2; LRxDR – 1; LRxLI – 1;
15	P	19.9	LBWxH – 6; LBWxGRW – 4; LRWxDR – 1; LRxSR – 2 LBWxLI – 1; LRxLI – 1;

Note: * Meanings of abbreviations: R – Lithuanian red; GR – German red; SR – Sweden red; DR – Danish red; SBW – Sweden black and white; H –Holstein; GBW – German black and white; LBW – Lithuanian black white and white; HE – Hereford; AB – Aubrac; CH – Charolais; LI – Limousin; SL – Salers; BB – Belgan blue; SI – Simmental

lais) breeds. Five mothers were cows of Lithuanian red breed and 2 were hybrids of this breed; interbreed with bulls of Limousin and Charolais breed. Age interval in this group has reached from 18 to 75 months.

Bulls, which carcasses were referred to U (very good) class of conformation had quite a wide distribution by breeds. This group was formed of specialized beef bull breeds (2 – Charolais, 1 – Limousin, and 1 – Aubrac) and 6 crossbreds, belonging to different breed's first and second generations. Hybrids exceptionally had fathers of only specialized beef (1 – Belgan blue, 2 – Salers, 4 – Limousin, and 1 – Charolais) breeds. Their mothers were 8 cows of Lithuanian black and white and 3 cows of Lithuanian red breed.

Our research data proves an affirmation of other authors, that beef cattle breeds' (Alberti et al., 2010) and their crossbreds (Keane and Moloney, 2003) carcasses are being estimated with higher classes of conformation than dairy. Age interval of bulls in this group was fairly wide and has ranged from 16 to 44 months.

The variety of bulls' carcasses, which were estimated with R (good) conformation class was also quite wide. This group consisted from specialized beef bulls – Hereford, Charolais and Limousin (1 bull per breed) and 7 hybrids of different breeds first and second generations. Their mothers of eight hybrids were Lithuanian black and white and one Lithuanian red cow. There also was one Lithuanian red and Limousins'hybrid mother, besides that – one Lithuanian black and white and Charolais'hybrid, and one mother of Lithuanian red and Charolais breeds' hybrid.

Their fathers mostly were specialized beef bulls (Charolais, Limousine, Salers, Belgian blue). However, among representatives of this class of conformation there were purebred dairy bulls – of Lithuanian red and Swedish red breeds, which carcasses were estimated to the R class conformation. The age of bulls in this group was fairly young – from 12 to 24 months.

Variation of breeds was most wide among bulls' carcasses, which had been graded with fair (O) conformation class. There were no thoroughbred specialized beef breeds bulls in this group. Ten bulls' mothers Lithuanian black and white, and 5 were Lithuanian red cows. Two fathers of all 15 bulls that have been graded, belonged to Simmentals', 1 – Charolais, and 2 Limousins' breed. Others were – German black and white (3), Holstein (2), Swedish red (2), Lithuanian red (1), Denmark red (1), and Lithuanian black and white bulls. The difference of cattle age in this group was fairly moderate (from 15 up to 24 months).

Among bulls carcasses that had been graded with poor (P) conformation class there were no purebred specialized beef breeds bulls. This group was formed of hybrids belonged to 6 different breeds. Their fathers were 6 Holsteins, 4 German black and white, 1 Denmark black and white, 2 Swedish red bulls and only two Limousins. All mothers belonged to been dairy cattle type – Lithuanian black and white, and Lithuanian red. Our study confirms the data, obtained from other researchers (Clarke et al., 2009; Jukna et al., 2009), that carcasses of dairy cattle breeds are mostly graded with lowest (O, P) classes than beef breeds. Bulls' age variation was quite wide in this group (from 12 to 24 months).

Data of researches that had been accomplished shows that conformation of bulls' carcasses depends on their age.

Cattle whose carcasses had been graded with the highest (E) class were 9.4 months (1.47 times) older during slaughtering, than those cattle that had carcasses estimated with the lowest (P) class. The received results are statistically significant ($P < 0.001$). It was ascertained that older cattles'(B categorys' cattle) carcasses had 2.48 times higher muscularity than younger ($P \leq 0.001$).

Our research results proves data of other authors (Serra et al., 2004; Jukna et., 2009), who claim that carcass conformation class gets higher with bulls age and the quantity of bulls carcasses that are being graded with class P, gets lower.

The breed of a cattle has influence to it's'muscularity of carcass. While exploring carcasses of purebred beef cattle carcasses, scientists (Jurie et al., 2005) established that Charolais breed' bulls had higher carcass conformation class than Limousin' cattle, though this index was lower than detected in Belgian blue cattle'(Cuvelier et al., 2006). Other scientists (Clarke et al., 2009) did not find more significant differences while exploring carcasses muscularity of Limousin, Charolais and Belgium blue breeds cattle.

Data of our research shows that carcasses of purebred beef cattle or its'crossbreds are being more often estimated with highest classes than with low (P) class. Specialized beef cattle or its'hybrids dominated among the cattle that had been estimated with class E, whereas only dairy breeds cattle or its' crossbreds were estimated with class P.

Our research study showed, that not only specialized beef breeds, but also local Lithuanian breeds, which were interbreeded with beef bull's hybrids, had highly carcasses muscularity.

Traditional dairy breed cows are frequently being inseminated with sperm of specialized beef breeds bulls' in order to reduce bovine production prices in the market. Efficiency of this crossing depends on many factors, particularly such as breeding and feeding conditions, besides that it depends on selection and adjustment of breeds (Jenkins et al., 1997).

According to accomplished scientific researches, it is established that crossbreds of correctly selected breeds sometimes distinguish from purebred animals with a higher rapidity of growth, better meat quality and higher carcasses conformation (O'Connor et al., 1997; Heinreich et al., 1998; Manfred et al., 1997; Wheeler et al., 1996; Rødbotten et al., 2010).

Researches data, obtained in the experiments with Lithuanian red cattle and their crossbreds with Limousine Charolais and Hereford cattle (Jukna et al., 2002), showed that hybrids had used less fodder to increase 1 kg of makeweight comparing to purebred Lithuanian red bulls.

Crossbreds' calves' weight after born was bigger than purebred Lithuanian red.

Researches noticed that at the age of 15 month, Charolais, Hereford and Limousin cattle crossbreds weighed more, and their carcasses were heavier than purebred Lithuanian red bulls.

Study accomplished in 2010 (Jukna et al., 2010) showed that crossing of Lithuanian black and white with Charolais and Limousin breed bulls had improved some fattening indexes and meat quality.

Therefore, it was determined that cattle breed had an influence on daily makeweight, and some meat quality parameters; and that they are hereditary (Captain et al., 2009).

Experiments accomplished in Slovakia (Krupa et al., 2005) showed that the breed had influence to live cattle weight of and their daily makeweight. Norwegian scientists (Rødbotten et al., 2009) detected, that crossing had uneven influence to crossbred bovine animals' carcasses conformation class.

In our study further analysis had been accomplished trying to establish the influence of live weight, weight and yield of carcass to bulls' carcasses conformation class. The influence of age on mentioned indexes, given before, was also evaluated (Table 2).

Research data, presented in Table 2, shows that preslaughter (live) weight of bulls, which carcasses were attached to E (excellent) conformation class had balanced from 469.0 to 980.8 kg. Thus, purebred Aubrac bulls had the biggest weight, whereas the least weight was detected in Lithuanian black and white and Limousin bulls'. Lithuanian black and white and Limousins breeds crossbreds had the minimal weight of carcass – 283.7 kg., whereas carcass of purebred Aubrac breed bull weighed 609.3 kg.

In order to detect the impact of breed on the carcass yield it had been estimated that the lowermost (58.6) belonged to bull whose mother was Lithuanian black and white and Limousin hybrid cow, and father – Limousin bull. A second generation hybrid of Lithuanian black and white and Limousin

Table 2
Preslaughtering weight, carcass weight and yields' influence on bulls' carcasses conformation class

n	EUROP	Live-weight, kg				Carcass weight, kg				Carcass yield of, %			
		Min	Max	M	Sd	Min	Max	M	Sd	Min	Max	M	Sd
15	E	469.0	980.0	646.5	155.8	283.7	609.3	399.1	96.3	58.6	64.8	61.8	2.0
15	U	432.0	954.0	624.8	141.9	283.7	609.3	399.1	96.3	58.4	64.9	2.5	4.3
15	R	394.0	752.0	583.6	112.9	243.6	587.1	365.9	89.7	54.6	64.9	58.4	2.5
15	O	398.0	775.0	613.7	101.4	206.5	416.3	322.7	58.9	49.8	55.8	52.5	2.7
15	P	371.0	638.0	514.1	73.4	173.8	321.0	250.7	37.3	45.5	52.2	48.8	1.8

breeds distinguished for having the biggest yield of carcass (64.8) in this group.

Live –weight of cattle, belonged to U conformation class reached from 432.0 to 954.0 kg. Charollais bull had the highest weight, while a hybrid of Lithuanian black and white and Belgian blue, and a bull whose mother was a Lithuanian black and white and Limousin crossbred cow and father – purebred Limousin bull. The carcass with lowermost (243.6 kg) weight belonged to Lithuanian black and white and Belgian Blue crossbred, whereas carcass of purebred Charolais bull weighed the most (587.1 kg). The lowermost (54.6) carcass yield were detected belonged to Lithuanian red and Charolais crossbred, whereas purebred Limousin bull had the highest (64.9) carcass yield.

Live –weight of bulls, which carcasses had been classified such R, variated from 394.0 to 752.0 kg. Purebred Charolais bull had the biggest weight, whereas a crossbred, whose mother was a Lithuanian black and white cow and father – a Limousin bull, had the minimal weight in this group.

The least carcass weight (206.1 kg) was detected in bull, whose mother was Lithuanian black and white and Limousin crossbred and father purebred Limousin. Otherwise Charolais bulls' carcass was the heaviest (446.0 kg) mass in this group.

Lowermost (50.0) carcass yield of this conformation class was detected in Lithuanian black and white and Charolais crossbred, whereas purebred Limousin had a maximum (64.3%) value.

Live weight of bulls, which carcasses had been graded to O (fair) conformation class, balanced from 398.0 to 775.0 kg. A German black and white and Lithuanian black and white crossbreds had the highest pre live-weight, whereas the lowermost pre-slaughtering mass was detected in Lithuanian red and Limousin breeds cattle. It was determined that crossbred of Lithuanian red and Limousin had the lowermost carcass mass, which reached 206.5 kg, whereas the heaviest carcass weighed 416.3 kg and belonged to Lithuanian black and white and German black and white crossbred.

In this study was determined that a Lithuanian red and Swedish red breeds' bull had the lowermost (55.8.) carcass yield, and a first generations' hybrid of Lithuanian black and white and Limousins' breed had the biggest yield (58.6).

While estimating the influence of live weight to carcasses muscularity, it was determined that, animals of class P had it balancing from 371.0 up to 638.0 kg. The heaviest was Lithuanian black and white and German black and white crossbred, whereas Lithuanian red and Limousin hybrid had the lowermost weight.

In this group the lowermost carcass weight belonged to Lithuanian red and Limousin hybrid and had reached only 173.8 kg, whereas the heaviest (321.0 kg) carcass belonged to Lithuanian black and white and Denmark black and white breeds crossbred. In order to estimate carcasses yield among this conformation class cattle carcasses, it was determined that Lithuanian black and white and German black and white hybrid had the lowermost (45.6) carcass yield, whereas the biggest (52.2) carcass yield were detected in purebred Lithuanian red and Swedish red bulls.

Other authors (Alberti et al., 2009; Clarke et al., 2009; Jukna et al., 2010) confirmed our data about animals'breed and age having influence upon pre-slaughtering and post-slaughtering weight and carcass yield.

Statistical analysis of this study results, showed that the bulls' age had an influence on animals'pre-slaughtering weight ($P \leq 0.004$), carcass weight, ($P \leq 0.0001$) and carcass yield ($P \leq 0.0001$).

According to this study results B category live cattle were 142 kg heavier ($P \leq 0.004$), their carcasses weighed 130 kg more ($P \leq 0.001$), and the carcass yield of was 6.69 ($P \leq 0.001$) higher than in A. The results received in this study are similar to other authors' data. The dependence of bulls weight and carcass weight on their age is confirmed by other scientists (Serra et al., 2004; Jukna et al., 2009). Researches held in slaughterhouses of Lithuania showed, that the bulls live weight gets bigger on average by 42.3 kg, and the mass of carcass increase by 25.3 kg during each two months period.

Due to of uneven intensity growth of tissues and internal organs, carcass yield increases during cattle growth period. Therefore the carcass quality is better when it has more muscle, body fat tissues, and less bone (Wajda et al., 2002; Berg and Butterfield, 2003) are detected.

In order to estimate distribution of indexes of adult bulls from all conformation classes, and analyzing the averages of indexes in all groups, they were at first compared to the common indexes average, later they were compared among one's one in separate groups of indexes. Averages of different conformation classes presented in Table 3.

From the data presented in Table 3, it can be noticed that bulls carcasses, belonging to E conformation class of distinguished for having the biggest average of live weight (646.5 kg), comparing to the common average of all tested groups.

Bulls, which carcasses were graded by U (very good) and O (fair) conformation class also had a higher average of pre-slaughtering weight, and their weight was 28.3 and 17.2 kg higher than the common indexes average in all groups.

Cattle that had been graded to belong to R (good) and P (poor) conformation classes had 12.9 and 82.4 kg lower pre-slaughtering weight comparing to the average of pre-slaughtering weight of bulls from all groups.

Table 3
Comparions of different conformation classes indexes averages in bulls

n	EUROP	Live weight, kg		Carcass weight, kg		Yield of carcass, %		Age of bulls, months	
		M	Disparity from average	M	Disparity of average	M	Disparity of average	M	Disparity of average
15	E	646.5	+50.0	399.1	+66.6	61.8	+6.5	29.3	+7.3
15	U	624.8	+28.3	365.9	+33.4	58.4	+3.1	22.3	+0.3
15	R	583.6	-12.9	324.2	-8.3	55.2	-0.1	18.4	-3.6
15	O	613.7	+17.2	322.7	-9.8	52.5	-2.8	20.1	-1.9
15	P	514.1	-82.4	250.7	-81.8	48.8	-6.6	19,9	-2.1
Average		596.5		332.5		55.3		22.0	

Bulls that had been graded to belong to E and U conformation classes, distinguished from other groups with the biggest carcass weight average. The carcasses weight averages in these conformation classes were 66.6 and 33.4 kg higher than the common average weight in all groups.

Bulls that had been graded to belong to inferior conformation classes had an 8.3 81.8 kg lesser carcass weight comparing with total carcass weight average, evaluated in conformation class groups.

It was detected that bulls with the highest – excellent (E) conformation class had a 6.5 bigger carcass yield average than the common average of carcass yield, whereas bulls belonged to U conformation class had a 3.1 higher in comparison with the total yield average of all carcasses.

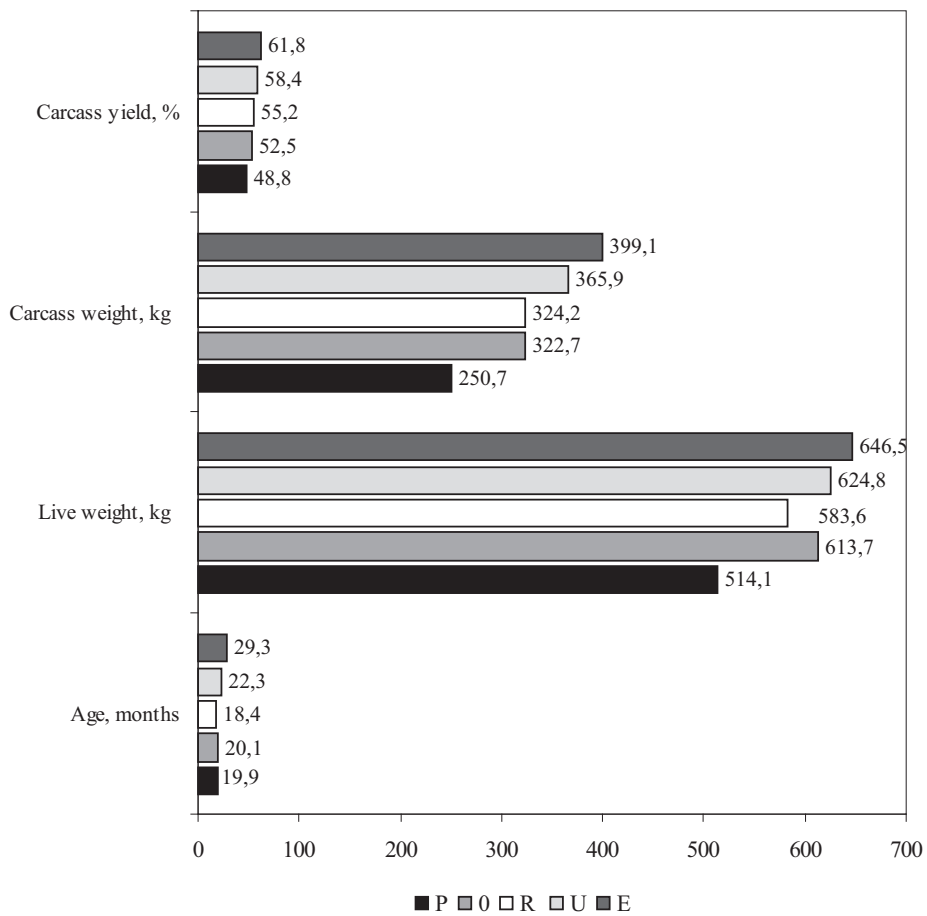

Fig. 1. The influence of bulls' age, live-weight, carcass weight and yield on carcasses conformation class

Bulls belonged to R (good) conformation class, had their carcass yield nearly match the common average and were only 0.1 lower.

Carcass yield of bulls that had been graded to belong to O (fair) and P (poor) conformation classes, were 2.8 and 6.6 lower than the total average carcass yield in bull, taken from all groups.

In order to detect the bulls age influence on carcasses conformation class, it was determined that bulls from the highest – E (excellent) conformation class it was the biggest and exceeded the total age average in all animals more than 7 months. During the research study, it was determined that the youngest slaughtered cattle belonged to R (good) and P (poor) conformation classes. Whereas bulls which carcass conformation class reached U (very good), were slaughtered in an average at 22 months of age.

The influence of all factors mentioned above on bulls carcasses conformation class is presented in Figure 1.

Data presented in this figure shows that bull's carcass conformation increases alongside of animals'age. Therefore it is seen from the figure, that the bulls, which carcasses were classified with excellent (E) conformation class, were older than 29 months, whereas the carcasses graded with low (P) conformation class, belonged to bovine animals younger than 20 months of age.

During analysis of distribution of the influence live weight to carcass conformation class, determined that bulls with highest conformation classes E (excellent) and U (very good), weighed more before slaughtering, whereas the significance of bulls weight was not equally declining in inferior conformation classes (R, O, P).

According to this study results, the average weights of carcasses, belonged to different conformation classes, it was determined that carcass weight increased alongside with conformation class. Carcass weight had variated from 250.7 kg (P – poor conformation class) to 399.1 kg (E – excellent conformation class).

The carcass yield depended upon the conformation class. Carcass yield of bulls, graded with E (excellent) conformation class had reached nearly 62 and gradually decreased on average of 3 with every class of conformation to bulls graded with the lowest – P (48.8) class of conformation.

Conclusions

Among adult bull carcasses, which had been graded with E (excellent) conformation class, 53 were obtained from purebred Aubrac breed bulls.

Graded with lowest (O and P) carcasses conformation classes bulls parents' were mostly (79.7) Lithuanian black and white and Lithuanian red, and only 20.3 of slaughtered bulls parents were specialized beef breeds (Charolais, Limousin, Simmental).

It were detected that bulls conformation class depends on age. Bulls, which carcasses were graded with the highest (E) conformation class had been 9.4 months older before slaughtering than those, which carcasses were classified with the lowest muscularity class (P) ($P \leq 0.001$).

It was detected in this study, that live-weight and carcass weight had a significant effect to their carcasses conformation class. Increasing in carcass conformation class (from P to E) lifted carcass weight (from 250.7 kg up to 399.1 kg), as well as carcass yield percentage (on average about 3% for each of the class).

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